Burn twice as brightly

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Amid the New Year's dearth of industry news, a new light has begun to shine brightly: Shuji Nakamura has made the world's first commercial blue laser diode. On the eve of a new century, the semiconductor blue laser diode is a breakthrough that promises to transform data storage and a host of other industry sectors. Meanwhile, InGaN LEDs continue to make progress, with the latest generation of LEDs seeming to promise to contradict the old adage that one who burns twice as bright does so for half as long.

In comparison with the LED, traditional light sources such as the domestic light bulb or car headlamp would seem to be in a different league. Much like the mythical infinitely long-lasting razor blade, however, ordinary light bulbs never seem to last any longer than they used to. The white LED would seem to be set to change all that.

The reason for this cautious optimism is that some serious people are now backing white LED technology. Moreover, these backers now include at least one manufacturer of light bulbs and vehicle lighting. Just before Christmas, Siemens announced that it would be placing its successful optoelectronics division in the care of its Osram lamps division. Forming such a new division as part of an overall company-wide restructuring was in contrast to the strategy adopted by fellow European opto component maker, Philips. (As reported here (*III-Vs Review*, Vol 11, No 3, p. 4), Uniphase acquired Philips Optoelectronics with Philips retaining a small share and a place on the Uniphase board).

Siemens had earlier licensed the white LED technology from IAF - the so-called LUCOLEDs - and was blending its Cree InGaN-on-SiC blue LEDs with local German technology from the IAF to create white LEDs. Siemens is clearly telling us that it intends to succeed not only in opto but also to save its traditional lamp business. With such commitment, the lamp business will likely see a step-function losing out of market share in many sectors to the all-solid-state semiconductor LED. This means that lamp makers will either have to get with the new technology or get out of lamps altogether - a situation reminiscent of the Swiss watch industry when digital watches came along.

One of Osram's competitors is Philips lighting division. This company has yet to announce any commitment to solid-state lamp technology. Moreover, with the Philips Opto - Uniphase deal this is even more distant. Add to that the closure of blue emitter R&D at Philips' US research centre and you have little evidence of any comparable strategy from Philips. In any case, Philips Opto, unlike Siemens Opto, was not into such LED technologies. The company has said that it will source suitable components from the open market when it needs next generation consumer products based on short wavelength emitters such as lasers.

Nichia has already blazed a trail to commercialize the white LED and is adding to a growing portfolio of products based on this technology. At this time these are specialist niches because of their fairly high unit cost. That Nichia should have got into short wavelength emitters was perhaps a little puzzling at first. Nevertheless, it makes perfect sense for a maker of lamp phosphors to seek new markets for its products.

Combining the high tech InGaN LED with older technology phosphors to create a solid-state fluorescent lamp makes excellent sense for the longer term. As your traditional business slowly reduces you maintain the pace by supplying into the products that are replacing it.

As yet you cannot buy a white LED domestic lamp but you can buy specialist lighting products for indoors and outdoors. One particularly useful white LED based product is the high-intensity portable lamp. It looks likely that portable lighting may well be the first significant market for white LEDs. Outdoor pursuits people are buying these lamps and leaving their old-fashioned lamps at home.

Portable lighting is going to be a big market for the all-solid-state lamp. For emergency lighting Nichia already has a number of products where high efficiency means excellent standby lighting derived from batteries. These are mainly for indoor use but the outdoor market holds much promise. Roadworks and so on would benefit from robust portable lighting rigs based on white LED arrays rather than high-power halogen lamps.

There are of course some technical issues that need to be addressed before the market really opens up for this device family, however, the way is becoming clearer for the commercial success of the white LED. Despite the new laser, for the moment it looks like the less-glamorous LED will stay in the limelight while the systems manufacturers design - in Nichia's newest breakthrough.

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